PEER REVIEW HISTORY

ARTICLE DETAILS

TITLE (PROVISIONAL)	Validation of two case definitions to identify pressure ulcers using hospital administrative data
AUTHORS	Ho, Chester; Jiang, Jason; Eastwood, Cathy; Wong, Holly; Weaver, Brittany; Quan, Hude

VERSION 1 - REVIEW

REVIEWER	Dan Li Assistant Professor, Dept. of Health and Community Systems, University of Pittsburgh, USA
REVIEW RETURNED	16-Apr-2017

GENERAL COMMENTS	The article is using a unique method to calculate the prevalence of pressure ulcers in Alberta, Canada through analyzing hospital discharge abstract database (DAD). The validation process and final results were stated clearly. If the method can be further developed, it can provide a relatively simple way to monitor pressure ulcer prevalence not only in one hospital but also in other hospitals where ICD-10 coding is used. My comments focus on research methods and statistical analysis. 1. The title of this article "Validation of a case definition to define pressure ulcers using hospital administrative data", but the article discussed two ICD-10 coding definitions for pressure ulcer. Although the two ICD-10 coding definitions are similar, they are still two different definitions which is not a case definition as stated in the title. 2. The article used enterostomal nurse consultation documentation to validate their two coded definitions and used two validated coded definitions to calculate the prevalence of pressure ulcers through DAD in the same hospital. The idea sounds good but wound consultation record and the DAD were all from medical records in 2011. My understanding is that both are for the same group of patients. I think the best way to do this is to use two independent datasets: one for validation (training), and the other one for final calculation (testing). 3. The article stated enterostomal nurse consultation documentation only included grade 3 and grade 4. I am wondering how the unstageable pressure ulcers were treated at this hospital. Some unstageable pressure ulcers are more severe than grade 3 and need medical attention as well. Why did the consultation documentation not include unstageable pressure ulcers in this hospital? The authors need to provide explanation on this. 4. Since enterostomal nurse consultation documentation only

	included grade 3 and 4 pressure ulcer cases, how did author validate coded definitions in grade 3 and 4 pressure ulcer cases, then extend the coded definitions to calculate all types of pressure ulcer prevalence (grade1-4, unstageable and deep tissue injury)? 5. For table 3, the authors need to explain how they get adjusted prevalence and number of case based on sensitivity in more details (such as methods and equations). The result of my calculation is different from the results in the article. Without detailed methods and equations, other readers may have the same concern as I do. 6. For table 4, if you add all the number under “pressure ulcer found in consultation", the total number is 1219, not the author stated 1217 in the abstract and result section. This discrepancies raise suspicions about the other several number differences mentioned in the last part.

REVIEWER	Annette Richardson Newcastle upon Tyne Hospitals NHS Foundation Trust England
REVIEW RETURNED	09-May-2017

GENERAL COMMENTS	This paper covers important issues with the measurement of pressure ulcers and offers interesting findings from the different information sources. It would be beneficial if a few issues could be clarified/covered: • administrative health data- could this be expanded to describe the data better e.g. what does it include, who enters it in the case notes/system, is it electronic or does it come from written case notes? • Other methods of determining pressure ulcer prevalence and incidence exist. Perhaps strengths/weaknesses of other methods should be considered alongside the Canadian system. For example in England pressure ulcer incidence is often reported using incident reports from the hospital incident reporting system. Plus a national system was set up called the NHS Safety thermometer as a real-time monthly prevalence check and one of the measurements is pressure ulcer prevalence. Good luck with the amendments

VERSION 1 – AUTHOR RESPONSE

Reviewer: 1
Reviewer Name: Dan Li
Institution and Country: Assistant Professor, Dept. of Health and Community Systems, University of Pittsburgh, USA
Competing Interests: No competing interests

The article is using a unique method to calculate the prevalence of pressure ulcers in Alberta, Canada through analyzing hospital discharge abstract database (DAD). The validation process and final results were stated clearly. If the method can be further developed, it can provide a relatively simple way to monitor pressure ulcer prevalence not only in one hospital but also in other hospitals where ICD-10 coding is used. My comments focus on research methods and statistical analysis.

Responses

1. The title of this article "Validation of a case definition to define pressure ulcers using hospital administrative data", but the article discussed two ICD-10 coding definitions for pressure ulcer. Although the two ICD-10 coding definitions are similar, they are still two different definitions which is not a case definition as stated in the title

**We agree and changed the title to “Validation of two case definitions to identify pressure ulcers using hospital administrative data”. Validation studies are a specific methodology involving validation calculations against a reference standard. If further detail in the title is needed, we are open to further changes.

2. The article used enterostomal nurse consultation documentation to validate their two coded definitions and used two validated coded definitions to calculate the prevalence of pressure ulcers through DAD in the same hospital. The idea sounds good but wound consultation record and the DAD were all from medical records in 2011. My understanding is that both are for the same group of patients. I think the best way to do this is to use two independent datasets: one for validation (training), and the other one for final calculation (testing).

**Thank you for this comment. Given the purpose of this study, which was “to validate Canadian administrative health data, also called hospital discharge abstract database (DAD), for determining if DAD could be used for pressure ulcer epidemiological studies and surveillance of pressure ulcers for quality improvement.” We believe our approach is methodologically appropriate and produced useful results. We do not have access to an alternate data source to create a testing dataset. In the future, we could use the suggested methodology for a different study which would add to the literature.

3. The article stated enterostomal nurse consultation documentation only included grade 3 and grade 4. I am wondering how the unstageable pressure ulcers were treated at this hospital. Some unstageable pressure ulcers are more severe than grade 3 and need medical attention as well. Why did the consultation documentation not include unstageable pressure ulcers in this hospital? The authors need to provide explanation on this.

**Thank you for this comment. We apologize for suggesting that the consultations were limited to stages 3 & 4. We re-consulted the clinical team and the process at that time did not include consistent staging of the ulcers. Therefore, we are unable to conclusively describe ulcer stage of the consultations. The wording has been clarified in the methods section. Unstageable ulcers were included in the consultations as the more severe cases triggered consults. We have included this issue as a limitation on pages 12-13.

4. Since enterostomal nurse consultation documentation only included grade 3 and 4 pressure ulcer cases, how did author validate coded definitions in grade 3 and 4 pressure ulcer cases, then extend the coded definitions to calculate all types of pressure ulcer prevalence (grade1-4, unstageable and deep tissue injury)?

**Once again, we did not intend to suggest that the consultations were limited to only stages 3 & 4. As such, our prevalence estimates do include some ulcers of all levels of severity. We addressed your concern in the Discussion section on page 11. We added “This [our low prevalence] can be attributed to several factors: the assumption that ET nurse consults likely included mostly the more severe (stage III, IV and unstageable) pressure ulcers while other studies included pressure ulcers of all severities,…”

5. For table 3, the authors need to explain how they get adjusted prevalence and number of case based on sensitivity in more details (such as methods and equations). The result of my calculation is different from the results in the article. Without detailed methods and equations, other readers may have the same concern as I do.

**Thank you for this comment. We have clarified the description of our adjustment methods on page 7. We have also added an Appendix with equations and detailed explanations of the analysis

methods. As well, we noted more clearly in the methods and Table 3 heading, that adjustment was based on both sensitivity and PPV. This method was deemed the most appropriate for determining validity for this low prevalence condition.

6. For table 4, if you add all the number under “pressure ulcer found in consultation", the total number is 1219, not the author stated 1217 in the abstract and result section. These discrepancies raise suspicions about the other several number differences mentioned in the last part.
*Thank you for this comment. We take responsibility for the confusion as there was an error carried over from a prior draft (i.e. a cut and paste error). To ensure correct numbers, we rechecked all calculations, analysis, and updated the tables. We are confident the numbers are correct in this draft. No other numbers changed.

Reviewer: 2
Reviewer Name: Annette Richardson
Institution and Country: Newcastle upon Tyne Hospitals NHS Foundation Trust, England
Competing Interests: None

This paper covers important issues with the measurement of pressure ulcers and offers interesting findings from the different information sources. It would be beneficial if a few issues could be clarified/covered:

• administrative health data- could this be expanded to describe the data better e.g. what does it include, who enters it in the case notes/system, is it electronic or does it come from written case notes?
**We agree your suggestion and added more description of administrative health data and have included such wording on page 3: “These data are collected by certified coding specialists (2-year Health Information Management diploma) who extract information about conditions and procedures from hybrid paper and electronic inpatient health records. They then assign World Health Organization International Disease Classification codes 10th version, Canada (ICD-10-CA).”

• Other methods of determining pressure ulcer prevalence and incidence exist. Perhaps strengths/weaknesses of other methods should be considered alongside the Canadian system. For example, in England pressure ulcer incidence is often reported using incident reports from the hospital incident reporting system. Plus a national system was set up called the NHS Safety thermometer as a real-time monthly prevalence check and one of the measurements is pressure ulcer prevalence.
Good luck with the amendments
**Thank you for this comment. We acknowledge and have experience with use of incident reports, which, unfortunately, greatly under-reported pressure ulcers, producing inaccurate data. Due to space limitations, in the background section we added a brief statement in critique of various methods for measuring prevalence of pressure ulcers. We also added international prevalence estimates from a recent systematic review paper (p.3).

We thank you for your time and reviews of this manuscript.

VERSION 2 – REVIEW

REVIEWER	Dan Li Ph.D, RN, BSN Assistant Professor Dept. of Health and Community Systems University of Pittsburgh School of Nursing 426 Victoria Building 3500 Victoria Street Pittsburgh, PA 15261
REVIEW RETURNED	02-Jul-2017

GENERAL COMMENTS	I feel that the authors have addressed most of my comments. I agree that this article can be published at current version. Thank you!

REVIEWER	Annette Richardson The Newcastle upon Tyne Hospitals NHS Trust UK
REVIEW RETURNED	28-Jun-2017

The reviewer completed the checklist but made no further comments.